

locality indicated for the others*; the remaining one, *X. atricilla*, has been observed on two occasions on the south coast of England, and by Montagu only. Of the two† additional European species, *X. melanocephalum* and *X. ichthyaëtum*, the former inhabits "southern," the latter "south-eastern" Europe. *Xema Franklini* is the only North American species which has not been obtained in Europe.

XXII.—On the Insects of Jamaica. By PHILIP HENRY GOSSE.

[Continued from p. 115.]

COLEOPTERA.

1. *Cicindela Guadalupensis*. I found this species in some numbers about the end of the year at Alligator Pond, on the sandy beach, close to the wharf; where the *Canavalia rosea* grows, and the beautiful *Convolvulus pes capræ* makes a carpet of verdure, and trails its long stems over the heavy sand. In May it was numerous at low-water on a little sandy (or perhaps rather muddy) point at Bluefields Creek, formed from the draining of the morass at the junction of the creek with the sea: immense numbers of little *Gelasimi* run over this point, and perforate it with their burrows in every part. Among them the *Cicindela* also run when it is not covered by the tide. They are as wary and as agile as their congeners elsewhere; on the wing with the approach of a footstep, and alighting at the distance of a few yards, so as to be caught with difficulty even with a net. I have taken them by running headlong among them, and making a dash at random with the net.

(*Carabidæ*. Two or three small species of this great family, I believe, occurred under stones at the summit of Bluefields Mountain, but I cannot now find the specimens so as to determine their genera.)

2. *Cybister lævigatus*. In some of the rivulets that cross the high road between Paradise and Savanna le mar. Its manners resemble those of the English *Dyticidæ*.

3. *Copelatus cælatipennis*.

4. *Dineutes longimanus*. At Basin Spring, in a brook having

* The species of *Iarus* (as distinguished from *Xema*) frequenting Belfast Bay are *L. marinus*, *L. fuscus*, *L. argentatus*, *L. canus*, *L. tridactylus* and *L. Islandicus*; all of which are common but the last:—it was once obtained. Specimens of these, as well as of the *Xemæ* noticed from the same locality, are preserved in the Belfast Museum.

† *X. plumiceps*, Bonap., is not enumerated in the 'Wirbelthiere Europa's' or 'Rev. Crit. des Oiseaux d'Eur.' (Schlegel).

an elevation of (perhaps) 1500 feet, I found in March several groups of this *Gyrinus*. Their manners were much like those of *G. natator*, but they were less rapid in their evolutions, and when diving did not show any little pearl of air at the extremity of the body. They huddled together more: at one dash of a small ring-net I took forty-five. I subsequently saw the same species at other seasons of the year in the same brook.

5. *Dineutes metallicus*. In a brook between Paradise and Savanna le mar in April.

6. *Creophilus villosus*. On two occasions I have observed this beetle crawling and flying about animal substances in a state of putrefaction. It has an extensive range, for in Newfoundland it is so abundant about the drying cod-fish as to be quite a pest; and I have found it also in Canada and in Alabama, U.S.

7. *Philonthus* (sp. nov.). On the Hampstead Road is a grove of rose-apple trees (*Eugenia jambos*); when this fruit is ripe the stone is loose, not nearly filling the cavity that incloses it. In the decaying rose-apples beneath the trees I found this little beetle common, together with a minute *Nitidula*; two or three being in the cavity of almost every decayed fruit. I do not apprehend that they are able to get into the cavity until a part of the pulp is destroyed by decomposition, but contact with the earth soon effects this. In no case were they in a sound fruit, though several in such condition lay beneath the trees. The season was the latter part of June.

8. *Belonuchus* (sp. nov.).

9. *Osorius* (sp. nov.). At the summit of Bluefields Peak in March, I found this beetle in some numbers beneath the rotting bark of a fallen tree.

10. *Osorius* (sp. nov.). Considerably less than the preceding: beneath a stone, on Bluefields Mountain, March 12th.

11. *Pæderus connatus* (Haliday). A curious little species, apparently destitute of both wings and elytra; the latter are however discernible by the aid of a microscope, but soldered together.

12. *Phanæus* (sp. nov.). Common on the roads, rolling pellets of horse-dung: it chiefly occurs in the lowlands.

13. *Onthophagus* (sp.). Bluefields, in December.

14. *Trox* (a sp. near *murinus*).

15. *Oryctes Jamaicensis*. Three or four specimens of this species were brought to me at different times; all found near Bluefields, and (as I believe) in the earth of cultivated grounds.

16. *Megasoma titanus*. Repeatedly brought to me, but I never found it alive. I have taken, however, the great horned males from the stomach of *Nyctibius Jamaicensis*, whence I infer that it flies by night.

17. *Cyclocephala signata*. Very abundant at almost all times;

flying in at the open windows, attracted by the candles, crawling in great numbers over the tables, wading through the gravy, or drowning itself in the tea. It is commonly known by the name of Christmas Bug, from its increased abundance at the end of the year.

18. — ? *Cræsus* (*Scarabæus Cræsus*, Newm.). This species seems to belong to an undescribed genus, and was previously known by a single specimen in the collection of the British Museum.

19. *Podalgus* (sp.). Taken at New Forest, near Alligator Pond, in December.

20. *Chalepus geminatus*. Flew into the house at Bluefields in May, attracted by the lights in the evening.

21. *Chalepus* (sp. near *geminatus*).

22. *Macraspis tetradactyla*. In May and June this glossy black species of the family *Rutelidæ* is abundant around blossoming trees. Both at Sabito and at the Hampstead Road we have observed it so numerous about certain trees as to give notice of its presence some time before we came near by the loud buzzing of the scores that were flying around the summit, while on approach the tree appeared quite blackened by the multitudes that were resting on every twig. On giving the tree a smart blow with a stick, the sudden rush into the air of hundreds of these beetles was really a spectacle worth seeing, and the noise produced by their wings was like that of a swarm of bees. The tree provincially called Potato-wood seems to be the kind chiefly resorted to by these assemblages. In May a piece of rotten wood was brought me, in which were many of this species, in the larva, pupa, and recently-evolved imago.

23. *Gymnetis lanius*. This is comparatively a scarce insect. A single one is occasionally seen in the spring, buzzing around a flowering bush, in the lowlands.

24. *Passalus interstitialis*? or *tlascala*?. Several were found beneath the rotting bark of a fallen tree, on the very summit of Bluefields Peak, in March.

25. *Polycesta* (sp. nov.). Found resting on a twig of a tree overhanging the high road near Content, in June.

26. *Psiloptera* (sp. nov. near *torquata*). This fine *Buprestis* was found in considerable numbers in June, resting on twigs of the lignum-vitæ tree (*Guaiacum officinale*), in an arid plain of very peculiar vegetation, just behind Pedro Bluff. I found the insects of this plain almost totally different from those found at the leeward part of the island. The elevation is scarcely above the level of the sea, the soil is sand, the trees scarcely attain a greater height than twelve feet, and therefore the heat of the sun is peculiarly intense. An hour or two in the middle of one day

in the very height of the summer afforded the only opportunity I had of examining this very singular region.

27. *Chrysodema corusca*. The Hampstead Road is the only locality in which I have found this brilliant insect; but there in the latter part of May and the beginning of June it is very abundant. It is almost invariably found resting on the foot-stalks of the leaves of joint-wood and other tall shrubs that overhang the sides of the road. When approached, though as yet the bush is untouched, each one warily shifts round, so as to keep on the opposite side of the stalk, exactly as the little *Tetigonia* do on the stalks of grass. The moment a finger is put near it, down it drops; so that we found the best way to capture it was to hold the ring-net beneath the twig and just tap the bush, when the beetle would drop into the net.

28. *Chrysobothris* (sp. nov.). An exceedingly lovely little insect, green with crimson bands. I took it as it alighted from flight at Phoenix Park, near Savanna le mar, in April.

29. *Agrilus* (sp. nov.). One of the fish-tailed group; curiously marked with two large orange spots on each side of the abdomen. Taken in June, both at Sabito and on the Hampstead Road.

30. *Agrilus* (sp. nov.). The thorax and forehead rich crimson. Taken at Hampstead Road in June: a single specimen.

31. *Agrilus* (sp. nov.). A pretty little black species, with the thorax and the tips of the elytra white.

32. *Pyrophorus noctilucus*. From February to the middle of summer this beetle is common in the lowlands, and at moderate elevations. Lacordaire's account of the luminosity of this *Elater* (known to me however only by the citation in Kirby and Spence's *Introd. to Ent.* ii. 333, 6th edit.) differs so greatly from the phenomena presented by our Jamaica specimens, that I cannot help concluding that he has described an allied but very distinct species, and I feel justified therefore in recording what I have myself observed. The light from the two oval tubercles on the dorsal surface of the thorax is very visible even in broad daylight. When the insect is undisturbed, these spots are generally quite opaque, of a dull white hue; but on being handled they ignite, not suddenly but gradually, the centre of each tubercle first showing a point of light, which in a moment spreads to the circumference, and increases in intensity till it blazes with a lustre almost dazzling. The colour of the thoracic light is a rich yellow-green. In a dark room, *pitch-dark*, this insect gives so much illumination as to cast a definite shadow of any object on the opposite wall, and when held two inches from a book the whole line may be read *without moving it*. The under part of the thorax has a singular appearance when the tubercles are fully lighted up; for the horny coat of skin being somewhat pellucid,

displays the light within redly and dimly, as if the whole thorax were red-hot, particularly at the edges, immediately beneath the tubercles. When left alone, the insect soon relapses into stillness, and the tubercles soon fade into darkness, either total, or redeemed only by a spark scarcely perceptible.

I had been familiar with this firefly for some weeks, and had made the above observations on it, without being aware that it possessed any other source of light than the thoracic tubercles. I had indeed remarked that when flying at liberty the light which it diffused was of a *rich ruddy glow*, and yet these individual insects, if captured and held in the hand, showed only *green light*. I much wondered at this, but knew not how to account for it, until a friend explained it, illustrating his remarks by experiment. On the *ventral surface*, when the abdomen is extended, there is seen, between its first segment and the metathorax, an oval transverse space, covered with thin membrane, which glows with orange-coloured light; totally concealed however when the abdomen is relaxed, by the overlapping of the metathorax. When the insect is placed on its back it throws itself into the air like other *Elaters*; but if it be made to repeat this many times it appears to become weary, and endeavours to raise itself by bending the head and the abdomen back, so as to rest on the extremities, in hope to *roll over*. It is when thus recurved that the abdominal light suddenly appears, the oval space being uncovered. When held in the hand, the same effect is produced by forcibly bending back the abdomen with the fingers; but this is not very easy of accomplishment, on account of the resistance of the closed elytra; but if these be held open with one hand and the abdomen recurved with the other, it is readily shown. As the open space, then, can be exposed only when the elytra are expanded, the reason is manifest why the red light is never displayed by the insect when walking or resting: the green thoracic light on the other hand *may* be displayed at any time; it is however very rarely shown during flight. On one occasion two or three fireflies, having entered the sitting-room in the evening, gave out the red light most brilliantly as they flew round near the ceiling, the spectators being beneath them; one of these, being alarmed by my efforts to capture it, gave out the thoracic light also very brightly; and the mingling of the green and red light in the evolutions of flight produced an effect indescribably beautiful.

That the thoracic light is subject to the will of the insect is indubitable; but whether the same can be predicated of the abdominal light I am not assured. During flight it is every second intermitted, as far as the observer can detect; but its appearance or disappearance may depend upon whether the dorsal or ventral surface is presented to the eye. This is when, soon after dark,

the insect is sweeping in rapid, headlong, irregular curves over the fields or along the edges of the forests; when the appearance resembles that of a stick with the end on fire (but not in flame) carried or whirled along by one running swiftly, quenched suddenly after a course of a dozen yards, to appear again at a similar distance. When slowly flying over the grass, the progress of one may often be traced by the red glare on the ground beneath; a space of about a yard square being brightly illuminated, when no light at all reaches the spectator's eye from the body of the insect.

Whether any light would appear pervading the abdomen if the segments were stretched, I cannot positively say, for I have not in my journal any note on this point. I think not, however; for in my repeated handlings of these insects and experiments on their abdomens, I could scarcely have avoided extending the segments, even unintentionally; but I am quite certain I never saw any light except in the one ventral and the two thoracic spots. If one be trodden on, a mass of mixed light remains for some minutes among the fragments. The story told by Peter Martyr of these *Elaters* having been hunted for, to eat the mosquitoes is sufficiently amusing; of course it is not right to *contradict* a statement because one has never verified it, but I may be permitted to observe that I utterly disbelieve it. That they might afford a substitute for candles in performing household operations that required no great exactness, is certainly true, provided they were constantly carried in the fingers; but if put under a glass, or allowed liberty in a room, as I have abundantly proved, they very quickly conceal their light. I have found too, that one kept beneath a glass would display very little light the next evening, even under the excitement of being handled, and on the following night would be irrecoverably dark: this may have resulted from the lack of food or of exercise, not I think from the lack of air or of moisture.

About the middle of May a larva of an Elateridous beetle was brought to me which was luminous; in the dark the whole insect was pellucid, but the divisions of the segments showed distinct light, blue and pale, not very vivid. It was impatient of being handled, and bit fiercely at the hand, but ineffectually. I suspect that it was the larva of this firefly: the specimen is now in the British Museum.

33. *Agrypnus* (sp. nov.). A single specimen occurred; taken on the 4th of June at Sabito.

34. *Ectinus* (sp. nov.). Taken at Belmont early in June.

35. *Limonius*? (sp. nov.). Hampstead Road, late in June.

36 to 38. *Sphærocephalus* (three species, minute).

[To be continued.]